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Final Degree Project
Biology (2020)

# Origin and evolution of the Caribbean Islands endemic plants

## The Islands

Figure 1. Source 8.

The Caribbean Islands, also known as the **West Indies**, are conformed by three archipelago. These islands have been categorized as one of the world's biodiversity hotspots with conservation priority as the ecosystem is threatened by loss of habitat from anthropogenic origin.

## Biodiversity: some numbers

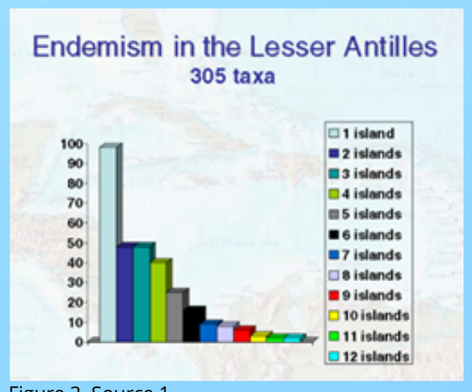


Figure 2. Source 1.

**12.847** taxa of seed plants, **10.948** are native and **7.868** are endemic (72% out of the native).

**1.447** native genera with **181** endemic and 10 nearly endemic, 47,5% of the endemic are monotypic.

The Greater Antilles hosts most of the endemic genera.

**Isolation**
Lithology
High lands

→ High endemic taxa
Floristic richness

## Geological History

**Greater Antilles**: originated as a submerged volcanic arc (Proto-Greater Antilles) between North and South America (130 Ma.) The last time the islands emerged as a landmass was 49 Ma and later Cuba, the Hispaniola and Puerto Rico split (25-20 Ma).

**Lesser Antilles**: originated in two times as oceanic islands.

**Bahames**: got the current configuration in the Eocene but the land surface and connections changed drastically due to the fluctuations in the sea level.

**GAARlandia**: an hypothetical land bridge connecting the north of South America and the Greater Antilles for 3 million years at Eocene-Oligocene transition (c. 33 Ma).

Figure 3. Source 9.

## Biogeography

2 ways of colonization of the islands from the continent:

**Vicariance:**

First interpretations considered the Proto-Antilles to be connected with the continent but now we know they were submerged. Now it is atribuited to GAARAlandia acting as a low-land connection for the biota.

**Long Distance Dispersal (LDD):**

Hydrochory (*Ernodea*, *Erithalis*).
Ornitochory (*Erithalis*, *Dendropemon*).
Wind and hurricanes, and flotsam.


*Erithalis fruticosa*
Figure 4. Source 3.

## Objectives

Learning the **patterns of plant biodiversity** in the West Indies.
Learning the **geographic origins** of the endemic plants.
Learning the way of **colonization** of the endemic lineages and do a quantitative analysis of the cases reported in the scientific literature.

## Methodology

This project is based on information that I acquired from scientific publications, books and web portals. This sources were found in "biblioteques UAB", PubMed, ResearchGate, Web of Knowledge, Google Schoolar and the library of "Ciència i Tecnologia de la UAB".

For the quantitative analysis I considered each endemic taxon or clade, its area of origin, if it was a case of dispersal or fitted in the GAARlandia model and the analyses that were done.

## Results

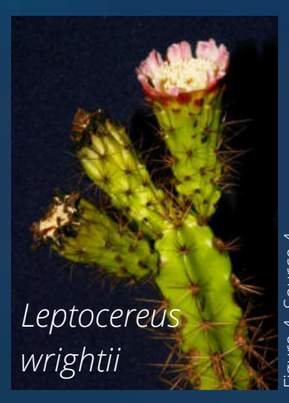
**Floristic Affinities**

- Abundance of neotropical elements from the continent.
- The shared genera reflect relationships between near territories which were once connected.

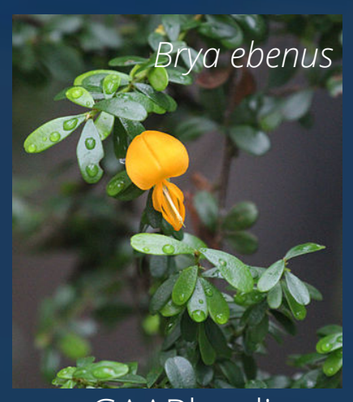
**Origin and colonization**

- Of the 32 studied cases only 13 were resolutive and therefore were part of the analysis. The vast majority fit with a dispersal model (77%).
- Origin: 54% South American, 15% Central American, 7'7% North American and 23% uncertain.

Endemic genera with South American origin:


*Leptocereus wrightii*
Figure 4. Source 4.

LDD


*Brya ebenus*
Figure 5. Source 10.

GAARlandia

## Conclusions

- The lack of knowledge and molecular data combined with the high floristic richness of the islands results in a poor understanding of the endemic plants.
- LDD has shown to be the most common explanation.
- Molecular datations are useful tools for discerning the way of colonization.
- It is necessary to study the effect of vicariance and dispersal within the Greater Antilles.

### Selected references

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